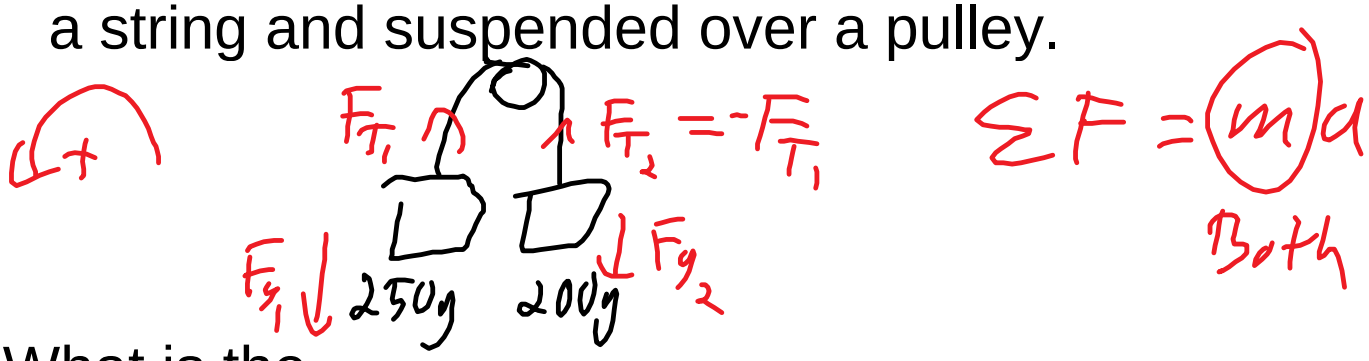
1. A 250g mass and a 200g mass are connected by a string and suspended over a pulley.

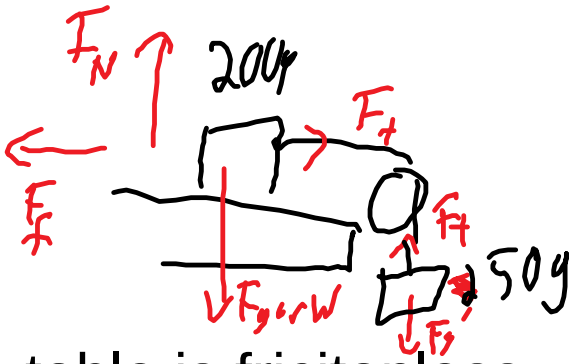


What is the

a) acceleration of each mass?

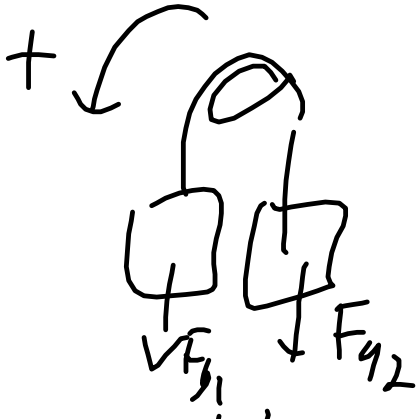
b) tension in the connecting string?

2. The 200g mass is now put on the table while the 250g mass hangs off the pulley. Answer a and b



i) the table is fricitonless

ii) the 200g mass slides with coefficient of kinetic friction = 0.30



Q1 $F_{net} = \Sigma F$

Since $F_{T_1} = -F_{T_2}$ they cancel

So $F_{net} = F_{g_1} - F_{g_2} = ma$

$$m_1 g - m_2 g = (m_1 + m_2) a$$

$$a = \frac{(m_1 - m_2)}{(m_1 + m_2)} g$$

$$a = \frac{0.25\,kg - 0.20\,kg}{0.25\,kg + 0.20\,kg} \; 9.8\,\frac{N}{kg}$$

$$a = 0.11 \times 9.8 \approx 1.1\,m/s^2$$

test $d = 1.0\,m$

$t = 1.15\,s$

$v_i = 0$

$a = ?$

$$d = \frac{1}{2} a t^2 + v_i t$$

$$a = \frac{2d}{t^2}$$

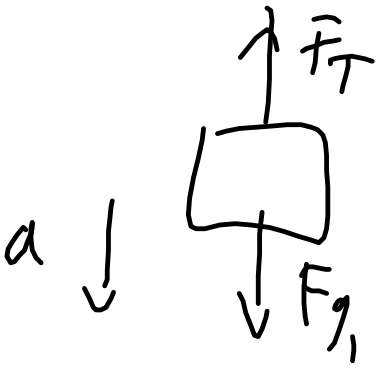
$$a = \frac{2(1)}{(1.15)^2}$$

$$= 1.5\,m/s^2$$

↑ off but

We are off due to the reaction time error of the timers, probably.

How about the tension?
The tension cancels out when we look at the whole system, so we must look at part of the system to find the internal forces.



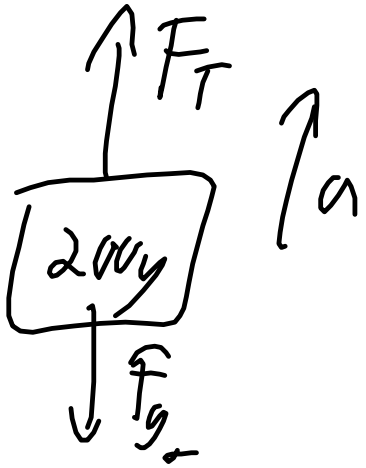
$$m_1 a = F_g - F_T$$

$$m_1 a = m_1 g - F_T$$

$$F_T = m_1 g - m_1 a$$

$$= 0.25(9.8) - 0.25(1)$$

$$= \boxed{2.2\ N}$$



$$m_2 a = F_T - m_2 g$$

$$F_T = m_2 a + m_2 g$$

$$F_T = 0.2\ kg(1\ m/s^2) + 0.2\ kg(9.8$$

$F_T = 0.2\,kg(1.1\,m/s) + 0.2\,kg(9.8\,N/kg)$

$\approx 2.2\,N$

question on the board
p103 CR 2.1-2.4
p106-107 Q 11, 19, 20, 22, 28